

The Future of the German Industrial Relations Model

Third revision 4 April 2015

David Marsden,
London School of Economics

d.marsden@lse.ac.uk)

1. Introduction
2. Contemporary challenges
3. Work systems in Germany and the UK.
4. Skill and knowledge assets, work systems, and their institutional supports
5. Employee voice and the stability of cooperation
6. Institutional change and prospects
7. References
8. Endnotes
9. Tables and Figures
10. Appendix

Abstract

The paper examines recent evidence on the erosion of the German industrial relations model. Although its coverage has declined, much of this has occurred in smaller and newer establishments, and compared with Britain, it has remained solid in the areas of Germany's traditional industrial strength. This is explained by the nature of high performance work systems that involve flexible working and on-the-job problem-solving. Both countries have modernised their work systems in recent decades, with German industrial firms maintaining higher degrees of worker autonomy and learning and British ones relying more on managerial control. The survival of the German model in this sector, as compared with services, is attributed to the role of such work systems in the high end of international competition. A model is developed to explain why stable cooperation within these work relationships is enhanced by means of a strong institutional framework. It is then used to explain why employers in the sectors using these systems have continued to work within these institutions. It is argued that employers' increased focus on the match between commercial needs and workplace institutions has contributed to the growing segmentation within German industrial relations which has been widely documented, and represents a departure from the classical post-war German model. The article finishes by asking how far this can go before damaging social and political cohesion.

1. Introduction¹

German industrial relations have passed through several major challenges in the last quarter of a century which have caused significant changes in the three pillars of the post-war model: coordinated bargaining, workplace codetermination and skill formation. Some observers ask whether changes in its corporatist and encompassing features, which had characterised previous decades, mean that it is joining the 'Anglo-Saxon' fold of liberal market economies as it seeks to compete in global markets (Der Spiegel, 1999). Others ask whether what Streeck (2004) described as 'beneficial constraints' have lost their bite. Instead of being collectively forced to adopt the path of high productivity and high wages, it is claimed that many German employers can now sidestep them whenever they have suitable outside options, such those arising from deregulation of domestic labour markets, as with the Hartz reforms, or from the opening up of opportunities for off-shoring to cheaper locations, such as in Eastern Europe. In this article, I argue that the German model has evolved in a way that reflects its distinctive economic strengths, compared with other similarly developed economies such as Britain. 'Erosion' has primarily occurred in areas to which the model extended for reasons of social inclusiveness and workplace democracy. In contrast, it has been maintained in sectors where it contributes to Germany's comparative industrial advantage. Ironically, these have often been engaged in international supply chains facilitated by opportunities in Eastern Europe. In particular, I argue that in sectors where the 'learning model'² of skill and knowledge development has been of growing importance, codetermination continues to provide an effective institutional framework, and that there, employers have found it is in their interest to retain it. Erosion has occurred primarily in activities where simpler models of management control are both effective and cheaper to operate.

Since 1990, pressures on employers to re-evaluate their commitment to the classical German model have greatly increased. The progressive completion of the Single European Market, coupled with reduced barriers to international trade globally, have forced changes in industrial relations and human resource practices across the EU. In Germany, these challenges were intensified by the fiscal burden of Reunification in 1990, which increased costs and may have contributed to Germany's 'lost decade' of slow growth during the 1990s, when its economy grew only half as fast as those of the UK and the US.³ However, Reunification and the opening up of Eastern Europe, also brought new opportunities, and opened up a new 'outside option', which it has been argued enabled employers to side-step former 'beneficial constraints' (Meardi et al., 2013). This opened up possibilities to renew historic connections with the less regulated transition economies of Eastern Europe, and increased access to their often highly trained but cheaper labour, which rivalled that in former West Germany (Hancké and Kurekova, 2008). As in other countries, German industrial relations have been tested by a series of revolutions in production systems, from its own high-skilled version of Taylorism in the 1970s, through diversified quality, lean, and modular production to integration in global value chains (Jürgens, 2004), as well as a shift towards more knowledge intensive activities, often based on network- rather than establishment-based patterns of organisation (e.g. Baumann, 2003, Sydow and Staber, 2002).

Associated with these pressures, there has been a growing internal diversity and increased segmentation within the German post-war model, accelerated by the Hartz labour market reforms (eg. Eichhorst, 2014; Hassel, 2014; Jürgens et al 2006; Kirchner et al. 2012, 2014 ; Palier and Thelen, 2010). A notable watershed was the defeat of the metal workers' union, IG Metall, in 2003 and the so-called Pforzheim Agreement of February 2004. This facilitated further development of local concessions on the terms of industry agreements in order to defend jobs.⁴ According to Streeck (2009: 53) it gave works councils an 'effective veto over union policy'. Although presented at the time as a practical measure to save jobs, the agreement has been widely regarded as a major defeat for the union, opening the way for greater segmentation as weaker firms would be the ones to take advantage of its provisions (Silva, 2013: 353).

I hope to contribute to this debate by using elements of the British experience to consider an alternative path that German firms might have taken, but chose not to, in activities where high-skilled production and cooperative workplace institutions continue to confer a comparative advantage. I shall argue that, since the 1980s, both Germany and Britain have had to transform work organisation in response to technical and competitive changes, and that Germany's stronger skill base and stronger workplace institutions have enabled many firms located there to pursue a high-discretion *learning* model of work organisation, compared with a more managerially directed *lean* model in Britain.⁵ The outcome is that in these activities German firms have been very successful in sustaining a high skilled input in international supply chains. Increased competitive pressures on firms in both Germany and Britain have led to a retreat of the classical industrial relations models in other sectors where employers felt they did not confer a competitive advantage given the nature and organisation of their production and service systems. Hence the shrinking inclusiveness and growing 'segmentalism'. To develop the argument, I outline a model of flexible employment relationships in which employers can benefit from both adaptive working and on-the-job problem-solving and learning, but to do so, they need to develop high-trust work relationships. These are favoured by institutional guarantees to workers, such as those provided by codetermination, as evidenced by the empirical studies showing, mostly, beneficial effects of works councils (see Jirjahn, 2010). Because both parties take considerable risks when setting aside protective work rules, flexible cooperation is not always stable, and without strong institutional support, there is always a danger that such rules will revert to more restrictive application when trust comes under strain. These cooperative relationships are costly, so that employers are likely to be more interested in developing and sustaining them when the economic benefits are most valued, such as in order to maintain their position in competitive supply chains. The retreat of the classical German model from other types of work place raises serious questions about social inclusion and workplace democracy, as argued by the 2006 Commission on the Modernisation of Codetermination (Kommission, 2006). Unfortunately these extend beyond the limits of this short paper, nevertheless, they need to be recognised, and some potential risks are considered in the conclusion.

2. Contemporary challenges

Given the scale of contemporary challenges, it is not surprising that the roots of current changes in the German industrial relations model can be traced back over many years. Hassel (1999) showed that two of the model's three pillars, works council presence and coverage by industry wage agreements had begun to decline before 1990, and after Reunification, eroded further. The trends she analysed have continued. In Germany as a whole, between 2000 and 2010, the share of employees covered by industry or firm agreements declined from 66% to 57%, and in former West Germany, from 69% to 60% ⁶ (Addison et al. 2012). This decline in coverage has also been reflected in union and employer organisation membership (Streeck 2009: Ch. 3). The share of employees covered by works councils in former West Germany also declined: from 50% to 46% (2000-2007). There has been an increasing share of councils operating outside both company and wage agreements, and a growth of firms with neither council nor wage agreement, up from one fifth to almost one third (Ellguth and Kohaut, 2013). In former East Germany, where the institutions were less securely established, the erosion was deeper. Restructuring and outsourcing by business organisations have also been argued to generate a form of 'vertical disintegration' (Doellgast, 2009). Many similar long-term changes have occurred in Britain. From the late 1980s, the decline in union membership density has followed a similar path in both countries. In Britain too, the share of employees covered by collective agreements has declined: overall from 70% in 1984, down to 39% by 2004, and in the private sector from 52% to 25% ⁷ (Brown, Bryson and Forth 2009: Table 2.2).

Behind the general retreat of collective regulation has been what some observers, such as Thelen (2009), speak of as a growing 'segmentalism' in the place of the formerly inclusive models. Thus in Germany, the fall in bargaining coverage has been concentrated among small establishments: between 2000 and 2010 it fell from 54% to 41% of employees among establishments with 5-49 employees, compared with 89% to 84% among those with at least 250 employees (Addison et al. 2012). ⁸ Works council coverage is also much lower in small than in large workplaces (Kohaut and Ellguth, 2008: in former West Germany in 2007, coverage was 10% in establishments with 5-49 employees, compared with 90% in those with over 500 employees, and 42% overall). Another aspect of this segmentalism is that, in both countries, a substantial part of the decline of collective representation has been associated with the difficulty of organising new establishments, which also tend to be smaller, rather than with loss of representation in older establishments. Jirjahn (2009) observes that firms' changes in works council status are infrequent. Similarly, for Britain, Machin (2000) showed the decline in coverage was due less to de-recognition in established workplaces than to the reluctance of new ones to accept unions.

The third pillar of the classical German model is provided by vocational training, and notably the apprenticeship system, which, since the 1960s, has been much stronger than in Britain. There similar reforms to those introduced in Germany to raise training quality had caused costs to rise, and triggered a prolonged decline despite a number of public policy initiatives to reverse it (Marsden, 1995, Steedman 1998). More recently this form of vocational training has also come under strain in Germany. Hillmert (2008) has argued that its former virtues have become obstacles to change, notably in relation to the expansion of service employment and

of higher education. It used to provide the foundation for both promotion within large-firm internal labour markets, and mobility between small and medium firms across occupational markets (Lutz et al., 2007). Yet, the steady long-term expansion of higher education graduates in recent decades has eroded the internal promotion opportunities for those with intermediate vocational skills, apparently confirming concerns about skilled-worker careers raised earlier by Drexel (1993). On the small firm side, Lutz et al (2007) ask whether there has been too much focus on the internal labour markets of large industrial firms, with a consequent neglect of the role of apprenticeship in sustaining inter-firm occupational markets. Similarly, Culpepper and Thelen (2008) argue that the cost and sophistication of apprenticeship are focused primarily on 'the demands of Germany's largest and technologically most advanced manufacturing exporters' (p. 43), hence its problems in small firms and service employment. Thus squeezed from above and below, partial erosion of this pillar appears to be reflected in the number of young people entering university that now surpasses those entering apprenticeship (Baethge and Wolter, 2014).

Take in: Figure 1. Strictness of employment protection in Germany and the UK 1990-2013

Workers' individual bargaining power is often a neglected part of the picture of worker representation. Yet it can play a very important role in regulating the employment relationship, and ensuring that workers get a fair deal from their employers, particularly over issues related to workloads and task assignments. It will be argued later that the articulation between individual and collective dealing with management plays a critical part in job regulation, and in particular, in the development of flexible work roles and on-the-job learning. For now, I focus on whether the decline in collective representation has been accompanied by a similar decline in workers' individual bargaining power. A worker's individual bargaining power compared to management is related to the latter's ability to threaten dismissal as a pressure tactic, and substitute a new hire. Two rough indicators of this are the strictness of employment protection regulations, and the practice of hiring workers into long-term jobs. Despite the aggregate decline in collective regulation of employment relationships, the OECD's index of the strictness of formal employment protection rules has changed little in both countries over the period, remaining considerably stronger in Germany than in Britain (Figure 1)⁹. The exception has been easing restrictions on the hiring of temporary workers in Germany, part of, but also predating the 2003-2005 Hartz reforms, which have led to increased hiring of workers on temporary and 'mini-job' contracts (Jacobi and Kluve, 2006). This is consistent with increased segmentalism in the German labour market. Turning to long-term jobs, falling job tenures could indicate weakening bonds between employer and employee, and potentially increased insecurity for workers, which was previously held in check by collective action. In Germany, despite the retreat of collective regulation of employment, and despite measures to liberalise labour markets, overall employee job tenures have remained remarkably stable for both women and men (Figure 2: upper panel). This stands in marked contrast to the decline in male job tenures in Britain over the same period, both overall, but also affecting early middle-aged men, aged 35-39, traditionally considered as the core labour force. It should be noted that the decline for British men is partly offset by an increase in women's tenures. However, a look at job tenures for

young German employees (aged 25-29: lower panel), compared with their elders, shows a decline since 1990, as their tenures have become more like those of their British counterparts. Several factors could lie behind this. Younger workers are more likely to be in temporary jobs, boosted by the Hartz reforms, and in new and small establishments where their individual bargaining power has less institutional support, which is consistent with increased segmentalism.

Take in Figure 2 Long term jobs for selected age groups in Germany and the UK 1992-2012.

Turning to the challenges of integration of large parts of manufacturing into global production systems, in both countries, the established models of employment relations in industry have faced similar pressures. However, a brief comparison of the manufacturing sectors, traditionally the heartland of organised industrial relations, in both Germany and the UK reveals some fascinating differences. In both countries, the employment share of manufacturing has fallen, but more steeply in Britain (respectively 22% to 18%, and 16% to 10% for 1995-2008: OECD STAN tables). However, these common trends hide a very different trajectory for manufacturing production. German manufacturing firms have been very successful in repositioning themselves within international supply chains: participating fully in what has become known as the 'trade in tasks' (Eriksson, 2010). This can be seen in Figure 3, where the share of exports in manufacturing gross value added has climbed steeply in Germany, but only modestly in Britain. By the time of the 2008 financial crash, for German manufacturing, exports were 80% greater than value added: it was exporting much more than it was producing domestically. In his book on competing in capabilities, Sutton (2012) argues that holding one's place in international supply chains is very competitive, requiring firms to attain the quality standards needed for the final product on the chain, while at the same time being innovative in managing process and cost improvements. It is a very different world from that envisaged by an earlier generation of Industrial Relations scholars for whom the workplace mostly transformed raw materials into final products. Herrigel (2014) provides a vivid illustration of this process.¹⁰

Arguably, employer confidence in workplace representative institutions is reflected in how far they are willing to work through them when seeking to adapt their businesses to changes in product markets such as those related to international supply chains. Reviewing the past two decades, Kotthoff (2013) observes that in many firms, works councils have played a key role as 'co-managers' in dealing with such issues, adapting by a process of 'cooperative modernisation'. Nevertheless, by doing so, these institutions came under great strain vis-à-vis their constituents (Müller-Jentsch, 2013). In contrast, British employers appear to have been less willing to do so. Analysing the 25-year historical time series of the British Workplace Employment Relations Surveys, Brown et al. (2009) found that since 1980 increased product market competition and engagement in international markets was associated with a greater than average decline in union coverage, suggesting that many British employers did not feel the need to work through collective institutions. An important clue to the importance of this difference can be found by comparing the nature of work systems in the two countries, and in

particular, the different institutional needs of the *lean* and *learning* models, which will be explained in the next section.

Take in Figure 3. Manufacturing value added and exports in Germany and the UK 1995-2008

3. Work systems in Germany and the UK.

How have German work practices kept pace with these changes in a way that favours Germany's position within these supply chains? This section uses data from a representative survey of European households, the European Working Conditions Surveys (EWCS), for 1995-2010, and enables a contrast between work patterns and trends in major economic sectors in the two countries.¹¹ Drawing on the recent literature on work systems, Lorenz and Valeyre (2005), and Holm et al (2010) identify four ideal types of work systems, and assess their extent using the EWCS. The four types are '*learning*', '*lean*', '*taylor*', and '*craft/simple*'. The distinguishing features of the *learning* model are employee problem-solving, on-the-job learning, job discretion, and autonomy. The link between these four dimensions has been established theoretically by Koike and Inoki (1990, see also Jürgens et al 1993, and Appelbaum et al 2000). Those of the *lean* model include team working, rotation, and some problem-solving but subject to stronger co-worker and managerial pressures. The *taylor* system is characterised by low job complexity, monotony, managerial pressures, and a low degree of worker engagement in problem-solving and learning activities. In contrast, the *craft/simple* model scores low on on-the-job learning but relatively highly on autonomy, and task diversity. Details of the questions used and how they load onto each work system are shown in the appendix. Although the EWCS is a survey of employees, derived from a sample of households, there are good reasons to believe that one may draw conclusions about the distribution of work systems that affect groups and not just individual employees. To test for this, the author regressed the typology of work systems on information from the respondents about human resource management practices in their workplaces, and notably, the type of pay system. This confirmed the presence of relationships between individual replies about work conditions and workplace practices of the kind predicted by Human Resource Management theory.¹²

At the aggregate level, combining industry and services, the diffusion of these work systems in the two countries appears both to reflect the different more skilled starting point for Germany compared with Britain, and to show a parallel decline in learning-based work systems from the beginning of the period (Table 1). Many researchers on vocational training in the two countries have observed its strength in Germany relative to Britain (eg Steedman and Wagner 1989), but also noted the challenges of growing service employment and pressure of equity markets for quicker financial returns (Culpepper, 1999). Nevertheless, a strong foundation in intermediate skills provides an effective basis for use of the 'learning' model in Germany (44% for all years combined, against 32% in Britain), whereas a weaker platform of intermediate skills in Britain constrains employers to use the *lean* and *taylor* models (respectively 38% and 15%, against 24% and 12% in Germany). Considering the economy as

a whole, it appears that the *learning* model has lost ground in both countries, in Germany to the *lean*, and in Britain to the *taylor* model.

A closer comparison of industry and services shows that the decline in coverage of the learning model in Germany has been a feature of service, but not of industrial employment. In German manufacturing, the learning model has progressed slowly since 2000, as has the *taylor* model. In Britain, the *learning* model has lost ground to the *lean* and *taylor* models, with the *lean* model maintaining its dominance over other types of work systems. Thus if we allow for the ripple effects of Reunification on the 1995 results for Germany, it seems that the modernisation of work systems has taken the form of the more managerially controlled *lean* model in Britain, whereas in Germany, it has if anything given more weight to the *learning* model. In the next two sections, I should like to outline a model of task flexibility and on-the-job learning in order to explain why industrial firms in Germany should have continued to work with labour institutions much more than those in services.

Take in Table 1 Distribution of work systems by sector in Germany and the UK 1995-2010

4. Skill and knowledge assets, work systems, and their institutional supports

As is well-known, the flexibility of the employment relationship is founded on an 'incomplete contract', that is, for an agreed wage, workers consent to their employers determining the specific tasks to be undertaken after hiring, by managerial authority. Such flexibility is of great value to the employer because it enables adaptation to variable organisational demands in the knowledge that the necessary labour will be available, and without the need to negotiate over each new task. In practice, most jobs have a core of regular tasks, but they also comprise a number of related tasks which provide greater adaptability, and by their nature are harder to predict.¹³ These related tasks, in particular, also provide opportunities for workplace problem-solving, and if workers are involved in this process, they may form the basis of dynamic on-the-job learning (Kern and Schumann, 1984, Koike and Inoki, 1990, de Dreu et al. 2003, Teece and Pisano, 1994). Although the economic theory of the employment relationship usually assumes that management simply directs workers to perform the tasks it assigns, what might be called the 'strong right to manage' model¹⁴, in practice, the more skilled workers are and the more they can supplement their skills with on-the-job learning, the greater the benefits to management of delegating task assignment to individual or teams of workers. Indeed, as will be seen later, the strong right to manage is really only practical for unskilled and routine jobs.

Delegating task assignment to workers entails certain risks for management and so requires goodwill on both sides. The nature of such risks can be explored in more detail by means of a bargaining model pioneered by Simon (1951).¹⁵ It rests on the idea that there is a range of tasks at particular wage rates that are potentially both profitable for the employer and acceptable to the worker. Within this, they agree a wage, and a set of tasks that make up the employee's job. It is often assumed that this relationship can function on the basis of a strong 'right to manage' whereby management simply instructs which tasks workers should

undertake. For example, in his classic account, Barnard (1938: 169) describes this set of mutually agreed tasks as a 'zone of indifference' for the worker. However, if the tasks differ in their value, then the smooth operation of the relationship will depend upon goodwill cooperation. This can be seen in Figure 4. The area of potential agreement over the scope of a job is shown by the overlap between the break-even satisfaction curves of the employer and the worker. Curve Sf_0 shows the employer's break-even contour, below which it makes positive and increasing levels of profit as we move towards Sf_1 , and to the origin.¹⁶ For the worker, curve Sw_0 shows her break-even contour, above which she is increasingly interested in a job with the employer as we move north-east towards the higher contour, Sw_1 .¹⁷ In the figure, wages increase up the vertical axis, and profits increase as one moves towards the origin (higher wages mean lower profits). Along the horizontal axis, tasks are ranked according to some characteristic of interest to both parties, such as skill level or problem-solving demands. This is kept simple so it can be shown in a two-dimensional diagram. The two parties then agree a wage, W_A , that compensates the future employee for the range of tasks she expects to have to undertake, and enables the employer to cover its labour needs and make a profit. Thus, the 'zone of acceptance', that is the set of tasks for a given rate of pay over which an employee agrees to accept management's authority in assigning work, lies where the agreed wage, W_A , crosses Sw_0 and Sf_0 , and so encompasses the tasks that lie between points A and B on the x-axis. The operation of this flexibility is most effective when there is goodwill on both sides, and it is undertaken in a spirit that seeks to maximise their joint well-being.

However, such cooperation is subject to two types of 'breach', which infringe the spirit of joint maximisation. First, this can arise because the tasks *within the zone of acceptance* differ in their values for each party. For example, at wage W_A , the tasks to the left of the zone of acceptance, near point A, are more profitable for the employer than those close to point B. For the worker, the tasks near B yield the greatest satisfaction at that wage rate. Such differences in the valuation of tasks within jobs are common in many organisations, and can be a constant source of tension, even though for both parties the tasks lie within the zone of acceptance. Thus one or other party could be tempted to focus on the tasks of greatest value to itself, irrespective of the satisfaction of the other party. One might think of this as 'cherry picking' the tasks of greatest benefit to oneself. At the agreed wage, the employer would be better off by imposing more profitable tasks, and the employee, by selecting the more interesting tasks. A second type of conflict may emerge should one party seek to impose tasks from *outside the zone of acceptance*, if for example investments in on-the-job learning make it more costly for one party than the other to terminate the relationship. Thus the employer might impose more routine tasks, or the employee might refuse to undertake such tasks and insist on more skill-enhancing problem-solving tasks than was understood in the original agreement. Scope for both types of breach becomes more open, the greater the extent to which management departs from the strong right to manage by delegating greater task discretion to employees.

Take in Figure 4 Flexible task assignments within the zone of acceptance

Such conflicts can play out in a number of ways, all of which potentially undermine flexibility and the willingness to engage in problem-solving tasks. The parties may haggle over work assignments, which may be costly in terms of lost production time, but by remaining within the area of potential agreement, neither side pushes the other to the point of termination. Alternatively, one might take advantage of the difficulty the other faces to find a replacement job or employee, and threaten termination in order to push the other party *outside its zone of acceptance*. These are sometimes referred to as 'Dove' and 'Hawk' strategies respectively. Both can be destructive of cooperation as they both send a signal to the other party that its partner is no longer seeking the joint benefit. Game theorists show that the best strategy, sometimes called 'Bourgeois', is to cooperate but be prepared to punish breaches should they occur. Its success requires that expected costs of sanctions facing the party in breach should exceed its expected gains, and that the offended party should always be ready to punish breaches if necessary (Maynard Smith, 1982, Bowles, 2004, Gibbons and Henderson, 2012).¹⁸ Following this line of argument, one can see that the greater the loss of benefit from foregone cooperation compared with the immediate gain from breach, the stronger the incentive for continued cooperation, which can then give rise to a virtuous circle comprising further on-the-job learning and growing mutual benefits.

In the case of the employment relationship, because of its open-ended nature and reliance on tacit understandings, this potentially neat solution encounters a number of difficulties. First, one of the parties may be slow to detect breach, and the longer that endures the greater the potential gains. Second, one or other party's valuation of future cooperation may change, and if it were to diminish (and its discount rate to rise), the longer it would be before the discounted long-term costs of lost cooperation exceed the short-term gains from breach, if ever. Yet early detection of breach is often difficult on account of the uncodified nature of task assignments within the zone of acceptance, and the variable frequency with which they occur. Repetition, and therefore time, is always needed to assess changes in the frequency, for example, of unfavourable assignments, because they cannot be inferred from a single occurrence. —Of course, such changes may occur also for reasons that reflect joint benefits, such as in response to changes in product market conditions. It becomes difficult therefore to distinguish adverse changes proposed in bad faith from those made in good faith.¹⁹ In the German context, for its proponents, one of the strengths of German 'diversified quality production' was that employees could work flexibly within broad jobs because they had 'redundant skills' not required by their normal workloads, but which could be called upon to deal with unusual tasks (Sorge and Streeck, 1988). A major change in profitability, such as occurred in the early 1990s, would make such tasks and skills too expensive. However, for the employees, it is often not clear whether the changed pattern of work is in the joint interest, or simply the result of their employer's desire to raise profits, and hence whether they should cooperate or punish. A third factor that may inhibit punishing breaches relates to asymmetries in net conflict costs, as the party facing the higher costs may be reluctant to act. Writing about enforcement of norms of exchange, Stinchcombe (1986: ch12) evokes the 'principle of lesser interest': the party with the least to lose has the upper hand. Usually, employers find it easier than workers to spread the risks of loss of income as a result of punishing breach because they can reassign work between their remaining employees, and adapt production schedules,

especially in medium and large firms. High local unemployment, or recruitment difficulties, could also reduce the respective willingness of employees or employers to punish breaches. All of these factors, by weakening the ability to punish breach, can undermine the willingness of the parties to engage in flexible jobs and learning for fear of exploitation by the other.

How can the parties respond to these problems? Voice channels are considered in the next section, but, within the logic of Figure 4, it is worth considering the 'individual' solution that involves only the actors immediately concerned, as that reflects the logic of the game theoretic pay-offs discussed earlier. This solution to potential breaches of goodwill seeks to limit potential gains by narrowing the zone of acceptance. Thus, employers and employees might seek to segment the zone of acceptance into a series of more narrowly defined jobs. This has a number of advantages for the more vulnerable party. Considering Figure 4, dividing the former zone of acceptance into two or more separate jobs has a number of effects. It reduces both the scope for cherry picking and its potential gains owing to the smaller variation in task values to either party within them. Narrow jobs also make it easier to detect and punish breach more quickly. Because they require only narrow, firm-specific, skills that can be learned more quickly, finding replacement workers or jobs is easier, thus reducing the potential cost and difficulty of punishing breach. Thus, compared with work systems based on broad flexible jobs, those based on narrow jobs can be more robust, and more resistant to attempts to play hawk or dove. However, this is achieved at the cost of reduced task flexibility, and reduced opportunities for dynamic on-the-job learning: a move away from the *learning* and towards the *lean* and *taylor* models. Such loss of flexibility need not occur all at once, but it may come about progressively over time as tasks whose acceptance would formerly have been expected automatically become problematic.

The importance of symmetry is illustrated in Figure 5. The axes show, for each party, the expected net benefits from cooperation over future periods that are put at risk by breach compared with the potential gains in the current period. Higher ratios reflect greater investments in firm-specific skills and knowledge, such as result from on-the-job problem-solving and learning. The 45 degree line shows where these are symmetrical between the parties, and where the systems are most robust because both are equally ready to punish breaches. A displacement from this represents a disadvantage to the party with the higher ratio, reflecting Stinchcombe's principle of lesser interest, and if it persists, that party would be more secure by moving to a lower level, for example, by retreating to narrower jobs with more specific task obligations.²⁰ When the ratio falls below unity, net gains from breach exceed punishment costs, so the temptation to play Hawk or Dove is too great for a viable employment relationship, and a sales contract which specifies task obligations in advance will be preferred. The figure illustrates how the retreat from flexible working need not be sudden and dramatic. It is more likely to emerge as the quality of cooperation degrades, and workers disengage from the additional activities related to their jobs, in a process analogous to method drift under incentive pay systems (Schmiede and Schudlich, 1976). Active use of voice channels provides an alternative solution.

Take in Figure 5 Tipping points and feasible contract models under different conflict cost conditions

5. Employee voice and the stability of cooperation

One of the most important institutional stabilisers is the provision of voice channels that enable the parties to explain the reasons for change, and in the process come to understand better the actions required to promote joint benefit within the employment relationship. It can also facilitate adaptation to new conditions and, if needed, renegotiation of the initial agreement. It can also provide a critical intermediate step in dispute resolution between the initial perception of breach and the use of sanctions. In particular, it enables both parties to explain the reasons for certain assignments, which can then be assessed for their reasonableness or otherwise. This is particularly important given the often ambiguous nature of breach discussed previously.

Voice can take both individual and collective forms, and in recent years, there has been growing interest in the role of individual voice in adapting the demands of individual workers' jobs. Rousseau (2005), for example, has coined the expression 'i-deals', which enable individual employees to negotiate adaptations of work roles and other terms of their employment with their managers. It has been common to think of individual and collective voice as rival channels because the former may induce employees with more marketable skills and abilities to seek individual solutions, and so detract from solidaristic ones. However, a recent study of individual and collective voice in France and Great Britain found that this rivalry hinged upon whether collective voice depended on the ability to mobilise support, or whether it existed as of right (Marsden, 2013). In the latter case, collective and individual voice could operate as *complements*. This is relevant to Germany because the statutory collective channels in France comprise works councils and statutory-based workplace delegates, with strong similarities to those in Germany. In that study, it appeared that the statutory voice channels were often used when workers could not get satisfaction from individual dealing with their managers. This is doubly significant in the light of the previous discussion of task assignments within the employment relationship. First, it provides a degree of additional protection for individual workers from unfair pressure from managers, and second, it can be used to discourage opportunistic action by individual workers that might be damaging to co-workers, and to the working relationship between employee representatives and managers.

Considering the four types of work systems, it is reasonable to suppose that the greater the degree of worker skill and task discretion the greater the potential benefit from both individual and collective voice. High levels of skill coupled with high levels of problem-solving and on-the-job learning activities, as postulated in Koike's (1997) theory of broad skills, make the learning model inherently harder to operate than the other systems. The resulting skills mean that the workers are expensive for the firm to replace, but as many of the acquired skills are firm-specific, finding suitable alternative jobs is also difficult. At the same time, the flexible task assignments and high degrees of task discretion, required for effective problem-solving, create the greatest scope for cherry picking of tasks by both parties.²¹ The

threat of quits and dismissals can make individual voice expensive to operate, hence, in this kind of work, individual voice can benefit from non-rival statutory forms of workplace voice, such as works councils and their workplace representatives. As the employer also has a strong stake in on-the-job learning, it too can benefit from effective employee voice, not only to minimise the use of quits and dismissals, but also to avoid the risk of a downward drift in cooperation. In contrast, in low-skill, low-discretion work systems, such as the *taylor* model, the right to manage is more strongly applied – workers have less task discretion – and jobs are narrower and more standardised so there is less reliance on goodwill cooperation.

Employee voice also plays an important role in the regulation of individual and collective dismissals, for example in establishing notice periods, and procedures for review. As argued earlier, employers often have a bargaining advantage because they better able to spread the cost of sanctions than can employees, and they can also more easily spread the cost of short-term labour market fluctuations. Thus, the threat of dismissal is often more potent than that of quitting. This vulnerability can make employees more reluctant to share investments in skills and in job flexibility. Whereas it is difficult for an employer, on an entirely individual basis, to make a credible commitment to respect these joint investments, this can be done against a background of independently binding procedures, such as those set in law or in collective agreements. Thus procedures that confine the right to dismiss to demonstrating good cause, and which provide for notice periods and consultation, can provide the assurance necessary for employees to be willing to invest in such skills and to work flexibly. Likewise, employee voice in workplace training can help to ensure that it is conducted in a spirit of joint interest. As German apprenticeships, both blue and white collar, frequently involve joint investments by employer and employee, and especially in larger, and more technically advanced firms, it is important that both parties are confident in its quality and in the prospects for a return on their respective investment (Dustmann and Schoenberg, 2008). This would explain why employees look to works councils to protect their return on investments in skill and flexibility (Jirjahn, 2009). It is therefore significant that the 2005 reforms of the German apprenticeship system reaffirmed its co-management by state, employer groups and workers, notably through their works councils (BiBB, 2014). All of these factors can reinforce the cooperation strategy which underpins the *learning* model. By facilitating exchange of information, voice channels make it easier to identify breach, and distinguish it from changes in job demands made in good faith. Employment protection rules and transferable skills help to protect especially employees against fluctuations in their individual bargaining power so that they can be more confident that their interests will be respected by their employers. The possession of transferable skills reduces vulnerability to unemployment, but it also provides a high common platform for additional workplace skills. As these factors develop, whether on the basis of collective or individual bargaining power, they provide an alternative to cooperation on the basis of narrow jobs. Finally, the institutions themselves take time to win the confidence of the parties both as concerns their effectiveness and their trustworthiness. Jirjahn et al. (2011) found that mutual confidence between management and works councils takes time to develop. This should not be surprising as employee representatives have to find common ground with management while maintaining their credibility with their constituents, which takes time.

Knowing this, employers would seek to maintain such relationships when they need their support for learning types of work systems.

6. Institutional change and prospects

The question at the start of this article asked whether, under pressure from global economic changes, Germany's industrial relations system is evolving towards a neo-liberal Anglo-Saxon model with a strong right to manage, and a diminishing role for independent labour representation, or whether, despite current changes, it retains its own distinctive path. To an outside observer, despite its recent changes, a notable feature of the German industrial relations system has been its ability to adapt to different economic circumstances, both over time, but also between workplaces operating different types of work systems. Broadly speaking, the same legal rights to codetermination and union bargaining are available to all workers, whatever the nature of their work systems, and they have continued to apply to sectors as they have adapted to new technologies, and moved from one predominant work system to another, from Taylorism to lean and diversified quality production (Kern and Schuman, 1984, Jürgens et al., 1993). Moreover, it has allowed the key actors to operate with different strategies at different times. As Haipeter (2012) shows, although outside observers widely use the concept of 'social partnership' to describe the German model, the unions themselves are ambivalent about using the term. Indeed, Müller-Jentsch, who has long worked closely with the unions, proposed the alternative term 'conflict partnership'. Indeed, this diversity of strategies is long-standing. The contrast between the organisational descendants of the unions that Bergmann et al (1975) used to illustrate the 'cooperative' and 'conflictual' strategies in the 1970s remains pertinent today. Works council strategies also vary considerably from one firm to another, as Kothhoff (2013) emphasises. Sometimes this may be due to the economic situation, but it can also be affected by their long-term experience of dealing with management, as shown by Jirjahn et al (2011). Thus, one of the long-standing strengths of the German system has been its adaptability, although much of the current debate in Germany focuses on whether its limits have been reached.

In the 1990s, Ronald Dore (1996) anticipated the current debate about segmentation when he asked whether the German model was moving from a system of class to one of enterprise representation: from an inclusive system seeking to represent all workers to one focusing on those in the same enterprise. Apart from the then shifting focus of wage bargaining, Dore also foresaw the impact of the increasing supplementation of occupational skills with firm-specific training. The latter observation highlights a very important feature of the learning model, which extends beyond the workplace, to the relationship between the three key actors in the modern firm: workers, managers and investors. In his remarkable Clarendon Lectures, Aoki (2010) considers how the development of the learning model alters the balance within this three-way relationship. The base point of his analysis is the hierarchical model of nested principal-agent relationships used in his ideal-typical representation of the Anglo-Saxon shareholder firm, the *A-firm*. In the *A-firm*, investors provide the physical assets, managers their technical knowledge and expertise in coordination, and workers, their human capital skills. Aoki considers the economic balance within this model as the outcome of a three-way

bargain: how can the three types of actors collaborate in a potentially beneficial productive enterprise while ensuring that each receives its share of the benefits. Each party can ensure its return on the physical, knowledge and skill assets it contributes by the threat of withdrawal, or 'exit'. For this to apply, the parties must have viable outside options which requires that their respective assets be separable. Each must be able to redeploy its assets elsewhere at an equivalent level of productivity. Thus workers and managers, for example, should be able to work as effectively with other teams of workers and managers in other organisations.²²

The learning model changes this balance because incumbent workers acquire knowledge and skills that are specific to their current employer, and when fully developed by a process of joint problem-solving and learning by small groups of workers and managers, then the knowledge and skill assets of workers and managers become progressively more intertwined, and less separable. In the strong case of the learning model, Aoki argues that their assets may become 'fused'. As a result, both workers and managers depend more heavily on mutual goodwill, but also, this interdependence creates a shared interest between them, and makes it harder for the third party, investors, to discipline managers and through them, the workers. Thus the disciplines of the hierarchical *A-firm* model are eroded, and alternative mechanisms for ensuring productive collaboration are needed. Aoki identified one model as the archetypal Japanese firm, the *J-firm*, and another, in his lectures, as the archetypal full codetermination German firm, the *G-firm*. In these, different managerial disciplines apply than in the *A-firm*, ones that are more suited to the learning model. In particular, both the *J-* and *G-firms* involve high degrees of participation by all three parties in the governance of the firm. The learning model brings specific risks for each of the parties. Exit is more difficult for investors once their resources are committed because they risk forfeiting the higher returns of high productivity labour. Likewise, managers and workers have skills and knowledge that are less readily deployed to other organisations; and the more flexible and adaptive job boundaries deprive workers of protection against arbitrary extension of their work roles discussed in Section 3 above. They also involve the risks of diluting the transferability of their occupational skills by supplementing them with firm-specific skills. For all parties, shared skill and knowledge assets make use of the outside option much harder to apply than in the hierarchical *A-firm*, and so necessitate alternative governance mechanisms.

Supervisory boards on which both labour and shareholder representatives are present provide a formal institution equivalent to the more informal channels applied in the governance of the archetypal *J-firm*. Works councils provide a formal channel for worker-management joint decision-making on key issues. In similar vein, participation in inter-firm labour and employer organisations provides channels of influence and information that can support goodwill relationships in the workplace, such as those needed to underpin the learning model. For the future of the German model, Aoki's argument implies segmentation in the form of maintenance of the codetermination model in Germany in sectors where the learning model is needed for economic success, and potential erosion elsewhere.

As is clear from the data on work systems, many firms in Germany operate alternatives to the learning model. According to the argument of this paper, it is in firms using these systems that

conditions are more likely to lead to the emergence of a weakly regulated segment with poorer conditions of pay and employment. Eichhorst (2014) has shown that, since the Hartz reforms, temporary and agency working has grown most in services and in routine and low-skilled jobs. EWCS data confirm for Germany that use of agency and fixed term contracts has progressed most among employees working in taylorist systems, and least among those in the learning model.²³ Even within the high-skill sectors there has also been a modest increase in the use of agency labour especially for routine administrative and low-skilled jobs. The role of works councils in negotiating such changes is illustrated by some of the cases cited by Kotthoff (2013), where changes have been agreed in order to help the employer improve its cost competitiveness, and to protect the skills of its core workers. If the argument of this paper is right, it suggests that behind the diversity of work systems among German firms lie the skill and knowledge requirements for operating in different product markets. Thus, the firms that derive greatest benefit from the model's governance mechanisms seek to retain and reform its structures, whereas those that derive less benefit seek to reduce its cost and if necessary to opt out.

Nevertheless, even firms that do not practice the learning model face risks when contemplating use of the opt-out path. Institutional retreat does not necessarily mean that workers have lost all their individual and small group bargaining power. One important feature of the German model has been the separation of bargaining over pay from that of agreeing work assignments. Despite union decline in Britain, and despite the reassertion of the right to manage, in many British firms, the same job level negotiation between workers and their immediate managers persists (eg. Knights and McCabe, 2000).²⁴ Often, the associated conflict is more akin to the prolonged haggling associated with Dove rather than Hawk conflicts yet these reduce productivity and erode goodwill. Taking a longer term perspective, arguably, such daily low-level workplace conflict contributed much to the low productivity and decline of the British engineering industry in the 1960s to the 1980s and was prominent in the thinking of Britain's Royal Commission on Trade Unions and Employers' Associations (1968). With a background of strong labour demand and low unemployment until the mid-1970s, treating wage bargaining and work organisation issues through a single channel of representation meant that daily task assignments became the subject of frequent negotiation between line managers and work groups. The individual 'i-deals' explored by Rousseau (2005) potentially pose similar problems. To a degree, in contrast to what Coase (1937) had argued, the employment contract ceases to substitute a single bargain for myriad of open-market negotiations: instead, it becomes the first of a myriad of small bargains within the firm that follow hiring. Since that period, firms in Britain have largely re-established control over the work process, but they have often done so by ensuring that workers remain easily substitutable so that the dismissal threat remains credible, on the lines of the *A-firm*. Arguably, this has a price in terms of the potential knowledge and skill assets forgone in order to maintain this state of affairs, and has constrained British firms to adopt the *lean* rather than the *learning* model when modernising their work organisation (Keep and Mayhew, 1998).

In contrast, Germany's dual system largely avoided this outcome by separating responsibility for wage bargaining from that for workplace issues, and assigning these respectively to unions

and works councils. Line managers could not use pay as a resource to get employees to accept task assignments, and individual employees and work groups could not make their acceptance conditional upon doing a deal with their manager. By dividing areas of employee influence in this way, the German system has been able to provide both sufficient voice to support cooperation while at the same time making it harder to use strength in one area to support demands in another.²⁵ This partitioning is jeopardised by the erosion of the coverage and 'spill-over' effects of collective agreements.

This article has proposed that the decline in coverage of the German model of industrial relations reflects an increasing alignment between the type of work systems that firms operate and their institutional needs for stable cooperation. The learning model, which it has been argued is important for Germany's high performance manufacturing, has sustained employer interest in the benefits they derive from a strong pattern of representation. In contrast, in other sectors, such as in many services and smaller firms, using different work systems, employer perceived benefit and engagement has declined, hence the institutional retreat. More detailed empirical work would be needed to establish this argument with greater confidence, notably to document the hypothesised link between the *learning* model, institutional support, and economic performance which is not possible on the basis of the EWCS. There should also be some caution in estimating the extent of decline because of the need to choose a base period for comparison. Often that base period has reflected the peaks of the late 1970s and early 1980s, which coincided with the end of the period of rapid inflation. At that time, workers needed unions to defend their relative pay, and employers needed the protection of wage agreements negotiated by their employers' associations. At that time also, one common concern, defending living standards, tended to drive out other more differentiated concerns in the workplace. Thus part of today's 'segmentalism' may reflect the unwinding of institutional patterns that were developed during the fight against the common enemy of inflation. The time lag may seem long, but other economic institutions, such as those of European monetary policy, also continue to bear the imprint of the 1970s inflation.

Although a full discussion is beyond the scope of a short article, segmentalism poses three serious problems for German industrial relations, and for German society more generally. The first concerns the question raised by the codetermination commission which emphasised that workplace representation is also a form of industrial democracy from which workers in firms without collective representation are excluded. In view of the wage disadvantage of workers in establishments outside collective agreements (Addison et al, 2012), it seems doubtful that lower-paid workers have been able to substitute individual for collective voice. The second concerns how far segmentalism can go before it undermines social cohesion and political stability. Sinn (2006) cites competitor hourly wages that are as little as 13% of those in Germany when he urges greater wage flexibility to boost employment. Wage flexibility of such magnitude would take some German wages well below international definitions for poverty within a country. Thirdly, there must be concern for the long-term stability of the slimmed down codetermination model, and its greater reliance on the self-interest of individual firms, and their supply chain partners. Market fortunes and technologies change, and can do so abruptly, so that the short-run profitability of a particular type of work system

for individual firms can shift. Streeck (2009) emphasised how the classical German model embodied a number of mechanisms for sharing firms' and workers' economic risks and adjustment costs more widely, with other firms, other workers and with the state. It might be harder to preserve the learning model without such mechanisms as it would force firms to adjust to economic shocks more rapidly, and potentially strain relationships of mutual trust.

7. References

- Addison, John; Teixeira, Paulino; Evers, Katalin, and Bellmann, Lutz (2012) *Is the erosion thesis overblown? Evidence from the orientation of uncovered employers*. IZA DP No. 6658, June, IZA, Bonn.
- Aoki, Masahiko (2010) *Corporations in evolving diversity*, Oxford University Press, Oxford.
- Appelbaum E, Bailey T, Berg P, and Kalleberg A. (2000) *Manufacturing advantage: why high-performance work systems pay off*. Cornell University Press, Ithaca
- Baethge, Martin, and Wolter, Andrä (2014) The German Skill Formation Model in Transition: From dual System of VET to Higher Education? Paper presented at the IAB workshop 'The Transformation of the German Model'.
- Barnard, Chester (1938) *The Functions of the Executive*. Harvard University Press, Cambridge Mass.
- Batt, Rosemary, Holman, David, and Holtgrewe, Ursula (2009) The globalization of work: comparative institutional perspectives on call centers. *Industrial and Labor Relations Review*, 62: 4, pp. 453-488.
- Baumann, Arne (2003) *Path-dependency or convergence? The emergence of labour market institutions in the media production industries of the UK and Germany*. Doctoral thesis, European University Institute, Florence.
- Bergmann J, Jacobi O, and Müller-Jentsch W. (1975) *Gewerkschaften in der Bundesrepublik: gewerkschaftliche Lohnpolitik zwischen Mitgliederinteressen und ökonomischen Systemzwängen*. Europäische Verlagsanstalt, Frankfurt.
- BiBB (2014) *Training regulations and how they come about*. Bundesinstitut fuer Berufsbildung, Bonn
- Bowles, Samuel (2004) *Microeconomics: behavior, institutions and evolution*. Russell Sage Foundation, New York, and Princeton University Press, Princeton.
- Brown, William; Bryson, Alex; Forth, John, and Whitfield, Keith eds. (2009) *The evolution of the modern workplace*. Cambridge University Press, Cambridge.
- Cartter, Allan M. (1959) *Theory of wages and employment*. Richard D. Irwin, Illinois.
- Clegg, Hugh (1972) *The system of industrial relations in Great Britain*. Blackwell, Oxford.
- Coase, Ronald (1937) The nature of the firm. *Economica*, 4: 16, November, pp. 386-405.
- Crozier, Michel (1963) *Le phénomène bureaucratique*. Seuil, Paris.
- Culpepper, Pepper D, and Thelen, Kathleen (2008) Institutions and collective actors in the provision of training: historical and cross-national comparisons. Ch 2 in Mayer, Karl Ulrich, and Solga, Helga (eds) *Skill formation: interdisciplinary and cross-national perspectives*, Cambridge University Press, Cambridge, pp. 21-49.
- Culpepper, Pepper D. (1999) The future of the high-skill equilibrium in Germany. *Oxford Review of Economic Policy*; Spring, 15: 1, p43, 17p
- De Dreu, Carsten K. W, and Weingart, Laurie R. (2003) Task versus relationship conflict, team performance, and team member satisfaction: A meta-analysis. *Journal of Applied Psychology*, 88: 4, Aug. pp. 741-749
- Der Spiegel (1999) *Kapitalismus ohne Gesicht*. 1/7/1999
- Doellgast, Virginia (2009) Still a coordinated model? Market liberalization and the transformation of employment relations in the German telecommunications industry. *Industrial & Labor Relations Review*, 63: 1, Oct. pp. 3-23

- Doeringer, Peter B, and Piore, Michael T. (1971) *Internal labor markets and manpower analysis*. Heath, Lexington.
- Dore, Ronald (1996) Unions between class and enterprise. *Industrielle Beziehungen*, 3:2, pp. 154-172.
- Drexel I. (1993) *Das Ende des Facharbeiteraufstiegs? Neue mittlere Bildungs- und Karrierewege in Deutschland und Frankreich: ein Vergleich*. Campus Verlag, Frankfurt.
- Dustmann, Christian, and Schoenberg, Uta (2008) Why does the German apprenticeship system work? Ch 4 in Mayer, Karl Ulrich, and Solga, Helga (eds) *Skill formation: interdisciplinary and cross-national perspectives*, Cambridge University Press, Cambridge, pp. 85-108.
- Eichhorst, Werner (2014) The Unexpected Appearance of a New German Model, *British Journal of Industrial Relations*, advance online publication Jan 2014, DOI: 10.1111/bjir.12055.
- Ellguth, Peter and Kohaut, Susanne (2013) Tarifbindung und betriebliche Interessenvertretung: Ergebnisse aus dem IAB-Betriebspanel 2012. *WSI-Mitteilungen* 4/2013, pp. 281-288.
- Eriksson, Tor (2010) Labour market outcomes on internationalisation - what have we learnt from analysis of microdata on firms and their employees? Ch 11, pp. 221-243, in Marsden, David and Rycx, François, (eds) *Wage structures, employment adjustments and globalization: evidence from linked and firm-level panel data*. Palgrave Macmillan, Basingstoke.
- Gibbons, Robert, and Henderson, Rebecca (2012) Relational Contracts and Organizational Capabilities. *Organization Science*, 5: 23, Sept-Oct., pp. 1350-1364.
- Haipeter, Thomas (2012) Sozialpartnerschaft in und nach der Krise: Entwicklungen und Perspektiven. *Industrielle Beziehungen*, 19: 4, pp. 387-411.
- Hancké Bob, and Kurekova, Lucia (2008) *Varieties of Capitalism and Economic Governance in Central Europe*. NewGov/STACEE Report, September.
- Hassel, Anke (1999) The erosion of industrial relations in Germany. *British Journal of Industrial Relations*, 37: 3, pp. 483-505.
- Hassel, Anke (2014) The Paradox of Liberalization — Understanding Dualism and the Recovery of the German Political Economy. *British Journal of Industrial Relations*, 52: 1, March, pp. 57–81.
- Herrigel, Gary (2014) Globalization and the German Industrial Production Model. Paper presented at the IAB workshop 'The Transformation of the German Model'.
- Hillmert, Steffen (2008) When traditions change and virtues become obstacles. Ch 3 in Mayer, Karl Ulrich, and Solga, Helga (eds) *Skill formation: interdisciplinary and cross-national perspectives*, Cambridge University Press, Cambridge, pp. 50-81.
- Holm, Jacob R.; Lorenz, Edward; Lundvall, Bengt-Åke and Valeyre, Antoine (2010) Organizational learning and systems of labor market regulation in Europe. *Industrial and Corporate Change*, 19: 4 pp. 1141-1173.
- Hübner, Olaf and Jirjahn, Uwe (2003) Works Councils and Collective Bargaining in Germany: The Impact on Productivity and Wages. *Scottish Journal of Political Economy*, 50: 4, September, pp. 471–491.

- Jacobi, Lena, and Kluve, Jochen (2006) *Before and After the Hartz Reforms: The Performance of Active Labour Market Policy in Germany*. IZA Discussion Paper, 2100, April. IZA, Bonn.
- Jirjahn, Uwe (2009) The Introduction of Works Councils in German Establishments — Rent Seeking or Rent Protection? *British Journal of Industrial Relations*, 47: 3, September, pp. 521–545.
- Jirjahn, Uwe (2010) *Ökonomische Wirkungen der Mitbestimmung in Deutschland: Ein Update*. Arbeitspapier 186, Hans Böckler Stiftung, Düsseldorf.
- Jirjahn, Uwe; Mohrenweiser, Jens, and Backes-Gellner, Uschi (2011) Works Councils and Learning: On the Dynamic Dimension of Codetermination. *Kyklos*, 64: 3, August, pp. 427–447.
- Jürgens U, Malsch T, and Dohse K. (1993) *Breaking from taylorism: changing forms of work in the automobile industry*. Cambridge University Press, Cambridge.
- Jürgens, Ulrich (2004) An Elusive Model – Diversified Quality Production and the Transformation of the German Automobile Industry. *Competition and change*, 8: 4, pp. 411-423, December.
- Jürgens, Ulrich; Krzywdzinski, Martin; and Teipen, Christina (2006) Changing work and employment relations in German industries – Breaking away from the German model? *WZB Discussion Paper*, No. SP III 2006-302, WZB, Berlin.
- Keep, Ewart, and Mayhew, Ken (1998) The assessment: knowledge, skills and competitiveness. *Oxford Review of Economic Policy*, 15: 1, Autumn, pp. 1-15.
- Kern, Horst, and Schumann, Michael (1984) Vers une déprofessionnalisation du travail industriel. *Sociologie du Travail*, 4/84 pp.398-406
- Kirchner, Stefan, Beyer, Juergen, and Ludwig, Ute (2012) Wie viel Heterogenität gibt es im ‚Modell Deutschland‘? Zur Verbindung von betrieblichen Beschäftigungssystemen und Profilen der Innovationsfähigkeit. *Industrielle Beziehungen*, 19: 2, pp. 211-235.
- Kirchner, Stefan, and Beyer, Juergen (2014) Firm-level diversity in the transformed 'German Model'. Ch 10 in Hauptmeier, Marco, and Vidal, Matt (eds) *Comparative political economy at work*. Palgrave Macmillan, Houndmills, pp. 208-228.
- Knights, David, and McCabe, Darren (2000) 'Ain't Misbehavin'? Opportunities for Resistance under New Forms of 'Quality' Management. *Sociology*, 34: 3, Aug. pp. 421-436
- Kohaut, Susanne and Ellguth, Peter. (2008) Tarifbindung und betriebliche Interessenvertretung: Aktuelle Ergebnisse aus dem IAB-Betriebspanel 2007. *WSI-Mitteilungen*, 09/2008, pp. 1-5.
- Koike K, and Inoki T. eds. (1990) *Skill formation in Japan and Southeast Asia*. University of Tokyo Press, Tokyo.
- Koike K. (1997) *Human resource development*. Japanese Economy & Labor Series, no. 2, Japan Institute of Labour, Tokyo.
- Kommission zur Modernisierung der deutschen Unternehmensmitbestimmung (2006) *Bericht der wissenschaftlichen Mitglieder der Kommission mit Stellungnahmen der Vertreter der Unternehmen und der Vertreter der Arbeitnehmer*. http://kohte.jura.uni-halle.de/recht/Kommissionsbericht_Endfassung.pdf
- Kotthoff, Hermann (2013) Betriebliche Mitbestimmung im Spiegel der jüngeren Forschung. *Industrielle Beziehungen*, 20: 4, pp. 323-341.

- Landers R, Rebitzer J, and Taylor L. (1996) Human resources practices and the demographic transformation of professional labour markets. pp. 215-245, In Osterman P. ed. *Broken Ladders: managerial careers in the new economy*, Oxford University Press, New York.
- Lawson, Nicholas (2010) *Is Collective Bargaining Pareto Efficient? A Survey of the Literature*. Working Paper 558, Princeton University, Industrial Relations Section.
- Lorenz, Edward, and Valeyre, Antoine. (2005) Organisational Innovation, Human Resource Management and Labour Market Structure : a Comparison of the EU-15. *Journal of Industrial Relations*, 47: 4, pp. 424-442.
- Lutz, Burkhardt; Köhler, Christoph; Grünert, Holle, and Struck, Olaf (2007) The German model of labour market segmentation - tendencies of change. *Économies et Sociétés*, Série: Socio-Économie du Travail, AB, 28: 6, pp. 1057-1088.
- Machin, Stephen (2000) Union Decline in Britain. *British Journal of Industrial Relations*, 38: 4, pp. 631 - 645.
- Manning, Alan (1996) Authority in employment contracts: A bilateral bargaining model. *Labour Economics*, 3: 1, pp. 1-23.
- Marsden, David (1978) *Industrial Democracy and Industrial Control in West Germany, France and Great Britain*. Department of Employment Research paper No. 5, London (70p.).
http://eprints.lse.ac.uk/20537/1/Industrial_Democracy_and_Industrial_Control_in_West_Germany_France_and_Great_Britain.pdf
- Marsden, David (2013) Individual voice in employment relationships: a comparison under different forms of workplace representation. *Industrial Relations: a journal of economy and society*, 52: S1, Jan. pp. 221-258.
- Marsden, David W. (1995) A phoenix from the ashes of apprenticeship? Vocational training in Britain. *International Contributions to Labour Studies (Supplement to the Cambridge Journal of Economics)*, 5, pp. 87-114.
- Marsden, David W. (1999) *A theory of employment systems: micro-foundations of societal diversity*. Oxford University Press, Oxford.
- Maynard Smith J. (1982) *Evolution and the theory of games*. Cambridge University Press, Cambridge.
- McDonald I. J, and Solow R. M. (1981) Wage bargaining and employment. *American Economic Review*, vol. 71 no. 5, December, pp. 896-908.
- Meardi, Guglielmo; Strohmer, Sonja; and Traxler, Franz. (2013) Race to the East, race to the bottom? Multi-nationals and industrial relations in two sectors in the Czech Republic. *Work, Employment Society*, 27: 1, pp. 39–55.
- Müller-Jentsch, Walther (2013) Zwanzig Jahre Industrielle Beziehungen – Rückblick und Bilanz. *Industrielle Beziehungen*, 20: 4, pp. 258- 284.
- OECD (2013) *Employment Outlook, 2013* Organisation for Economic Cooperation and Development, Paris.
- Oswald, Andrew J. (1985) The Economic Theory of Trade Unions: An Introductory Survey. *The Scandinavian Journal of Economics*, 87: 2, Jun., pp. 160-193.
- Palier, Bruno, and Thelen, Kathleen (2010) Institutionalizing Dualism: Complementarities and Change in France and Germany. *Politics and Society*, 38: 1 March, pp. 119-148.

- Rousseau, Denise M. (2005) *I-deals, idiosyncratic deals employees bargain for themselves*. M. E. Sharpe, Armonk, New York.
- Royal Commission on Trade Unions and Employers' Associations (1968) Chair: Lord Donovan, Report, Cmnd 3623, HMSO, London.
- Schmiede R, and Schudlich E. (1976) *Die Entwicklung der Leistungsentlohnung in Deutschland: eine historisch-theoretische Untersuchung zum Verhältnis von Lohn und Leistung unter kapitalistischen Produktionsbedingungen*. Campus Verlag, Frankfurt.
- Silva, Stephen J. (2013) *Holding the shop together: German industrial relations in the postwar era*. ILR Press, Ithaca.
- Simon, Herbert A. (1951) A formal theory of the employment relationship. *Econometrica* 19:3, July, pp. 293-305.
- Sinn, Hans-Werner (2006) The Pathological Export Boom and the Bazaar Effect: How to Solve the German Puzzle. *The World Economy*, 29: 9, pp. 1157–1175.
- Sorge A, and Streeck W. (1988) Industrial relations and technical change: the case for an extended perspective. In Hyman R, and Streeck W. ed. *New technology and industrial relations*, Blackwell, Oxford, pp.19-47.
- Steedman H, and Wagner K. (1989) Productivity, machinery and skills: clothing manufacture in Britain and Germany. *National Institute Economic Review*, No. 128, May. pp. 40-57.
- Steedman, Hilary (1998) A decade of skill formation in Britain and Germany. *Journal of Education and Work*, 11:1, pp. 77-94.
- Stinchcombe, Arthur L. (1986) Norms of exchange, Chapter 12: pp. 231-267, in *Stratification and organization : selected papers*. Cambridge University Press, Cambridge, in collaboration with la Maison des Sciences de l'Homme, Paris.
- Streeck, Wolfgang (2004) Educating capitalists: a rejoinder to Wright and Tsakalotos. *Socio-Economic Review*, 2: 3, pp. 425-438.
- Streeck, Wolfgang (2009) *Re-forming capitalism: institutional change in the German political economy*. Oxford University Press, Oxford.
- Sutton, John (2012) *Competing in Capabilities: The Globalization Process*. Oxford University Press, Oxford
- Sydow, Jörg and Staber, Udo (2002) The Institutional Embeddedness of Project Networks: The Case of Content Production in German Television. *Regional Studies*, 36: 3 pp. 215-227
- Teece, David and Pisano, Gary (1994) The Dynamic Capabilities of Firms: an Introduction. *Industrial and Corporate Change*, 3: 3, pp. 537-556.
- Thelen, Kathleen (2009) Institutional Change in Advanced Political Economies. *British Journal of Industrial Relations*, 47: 3, Sept., pp. 471–498.

8. Endnotes

¹ Acknowledgements: The author wishes to thank participants at the workshop on 'The Transformation of the German Model', IAB, Nürnberg, February 13-14 2014, and especially, Guglielmo Meardi for extensive and thorough comments, as well as, the editors, and three anonymous referees. This paper draws on work in progress

as part of a more extensive study of work systems and the employment relationship. The author acknowledges also Eurofound for the use of the European Working Conditions Survey.

² See Section 3 below, which explains the four models of work systems used in this article.

³ Between 1990 and 2003, German GDP in constant prices grew by 23% compared with 47% and 48% respectively in the UK and the US (OECD Stateextracts: GDP, US \$, constant prices, constant PPPs, reference year 2005).

⁴ See EIRonline New collective agreements signed in metalworking:
<http://www.eurofound.europa.eu/eiro/2004/03/feature/de0403203f.htm>

⁵ I shall use the term 'German' firms as a short-hand to refer to firms locating their productive activities in Germany, and similarly for Britain. This clarification is necessary because of the increasing tendency for firms to organise production along global supply chains whose links are located in many different countries.

⁶ IAB panel data for workplaces with >5 employees.

⁷ Workplace Employment Relations Surveys (WERS) workplaces with >=25 employees.

⁸ The decline in coverage may overstate the loss of influence of collective agreements as substantial numbers of non-covered firms follow these agreements.

⁹ Formal rules of employment protection may of course be applied with greater or lesser strictness at workplace level, and one should bear in mind that those measured by the OECD relate to procedures, and not to levels of dismissals (OECD 2013: ch 2).

¹⁰ A potential downside to this process has been highlighted in a thought provoking article by Sinn (2006). He argues that that Germany's export performance gives a misleading impression of the overall health of the economy, and that this participation in international supply chains has had an adverse effect on employment in other activities in Germany in which labour has become relatively overpriced compared with international competitors.

¹¹ The EWCS is a household survey of workers across the EU which enquires about the nature of their work, their working conditions and health, qualifications, and some measures of the HR practices in their workplaces. The survey is designed to be representative at the national level, but the sample is large enough to provide some differentiation within countries, for example by major sector or occupation.

¹² The work systems were regressed on information about pay systems and related practices on training and job tenure for 1995-2010 on which the EWCS provides information. The detail is available from the author. Regressions were done using the full set of EU-15 countries to overcome sample size limitations. A multinomial logit regression was used, taking the Taylor system as benchmark. A separate logit regression was done for that system to facilitate interpretation of the results. The results are broadly consistent with economic and human resource theories of incentive pay. The need for cooperation and team-working in the Learning and Lean systems is reflected in the use of collective, company-based, incentive pay. The focus on individual output in Taylorist systems is reflected in the use of individual payment by results, but also in pay for specific inconveniences of the job, such as overtime, bad conditions and unsocial hours. Because of the nature of mlogit, the coefficients need to be read comparatively between work systems. Likewise with regard to investments in training and on-the-job learning (proxied by length of service), the Learning and Lean systems emerge as the predominant users. Turning to workplace size and occupation, whereas use of Taylorism increases steadily with establishment size, this is not the case for the other systems, which increasingly diverge from Taylorism as size increases. In terms of occupations, the Learning and Lean models are associated with managerial and technical work, whereas Taylorism is associated with blue collar and junior white collar work. This correspondence between individual reports of work organisation with workplace HR policies suggests strongly that the four types can indeed be interpreted as work systems. The derivation of the work system models from the EWCS is explained in the Appendix. Detailed regressions are available from the author.

¹³ This concept is recognised in the US O*net classification of occupations which groups the tasks comprising different occupations into core and peripheral tasks (<http://www.onetonline.org/>).

¹⁴ See Manning (1996).

¹⁵ Since Simon's article, this line of analysis has developed within the debate about whether union bargaining is best characterised by a 'right to manage' model, in which wages are negotiated but employment fixed by the employer, or an 'efficient bargain' model, in which both wages and employment are agreed (eg Oswald, 1985, Lawson, 2010). However, in this paper, the focus is on task assignments rather than employment, and in individual workers rather than unions. Thus, a strong 'right-to-manage' model would imply management dictating employee task assignments whereas the efficient bargain model would imply allowing a degree of employee discretion over tasks within an overall need to meet production and cost targets.

¹⁶ Conventionally, in wage-employment decisions in competitive conditions, the shape of the employers' profit curve is an inverted 'U', with its maximum intersecting the labour demand curve. Given fixed capital equipment, hiring additional labour at first leads to increased net revenues, but after a certain level, diminishing returns set in. In the context of tasks rather than employees, one could envisage an analogous process. For example, assuming a worker with a given type of skill and capability, if tasks increase in their skill demands, changing from the routine towards those incorporating more problem-solving demands, then productivity and profits increase initially as worker interest increases, but beyond a certain point, greater job demands lead to more mistakes and declining productivity. In a formal presentation, Simon (1951) observes that one may consider several different types of tasks, although they could not be shown in a two-dimensional chart. In the union bargaining model, the employer's profit curve is additionally affected by the declining sales price as output increases, following the downward sloping product demand curve, see for example Cartter (1959: Ch. 8), McDonald and Solow (1981), and Oswald (1985) in the analysis of optimal contracts in union-employer negotiations. See also Marsden (1999) Chapter 1.

¹⁷ For the worker, it can be shown that various mixes of tasks of different types are compatible with the same level of profit for the firm provided their shadow prices adjust. For example, if one were to imagine the firm as requiring a mix of routine and problem-solving tasks, and that these are to a degree substitutes in production, then provided employees' shadow prices for each type of task are adaptable to the task mix, it can be shown that for the same monthly wage, different mixes of tasks are compatible with the same level of profits for the firm. Thus for the same weekly wage (and profit) the worker could undertake a higher proportion of problem-solving tasks if she were willing to accept a lower shadow, or implicit, price for them than for routine tasks, and vice versa.

¹⁸ Maynard Smith and Bowles illustrate this for single move games, and Gibbons and Henderson show how it can work in repeated games.

¹⁹ For example, in Figure 4, a long-term fall in profitability can lead to a downward shift of the profit curves, so that $Sf0$ becomes $Sf1$. Because of the changed economic circumstances, some of the tasks situated to the right of the zone of acceptance, close to point B, become redundant for the employer. If this is caused by an external change, then it is probably in the joint interest of both parties to make adjustments, but the employee lacks reliable information to determine whether this is genuine.

²⁰ Crozier (1963) argues that work rules become restrictive in order to protect the weaker party.

²¹ For example, in their study of work hours in US law firms, Landers et al, (1996) show how promotion tournaments encourage associates to work very long hours despite the relatively high degree of discretion in their work.

²² Of course, firm-specific skills have played an important part in thinking about internal labour markets in the US. However, a critical difference with the learning model is that those skills had developed primarily within a taylorist model of organisation in which management determined the content and scope of jobs that workers undertook. In doing so, they also restricted the scope of learning opportunities on the job (Doeringer and Piore, 1971, Koike and Inoki, 1990).

²³ Detailed results are available on request from the author.

²⁴ Indeed, Hugh Clegg (1972) built his theory of the British industrial relations system up from the bottom, starting with an analysis of the work group. This is in sharp contrast to Dunlop's approach which focused on rule-making by organised actors representing labour, employers and the state.

²⁵ These ideas were developed more fully in a study of the use of separate zones of operation for different workplace institutions gives workers voice while still protecting employers' interests by stabilising the distribution of control (Marsden 1978). Empirical corroboration for this division of responsibilities can be found in Hübler and Jirjahn (2003) in which they show that works councils in firms that are covered by a collective pay agreement increase productivity but not wages, whereas those in firms without a collective agreement raise wages.

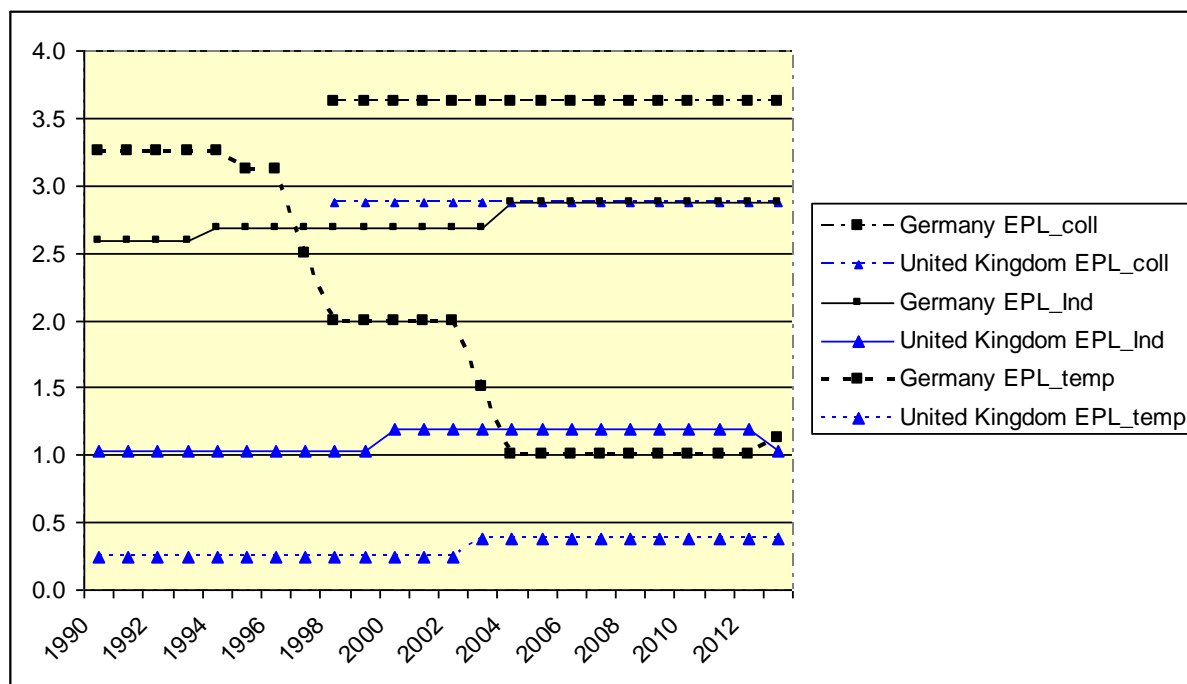
9. Tables and Figures

Table 1 Distribution of work systems by sector in Germany and the UK 1995-2010

	<i>Learning</i>		<i>Lean</i>		<i>Taylor</i>		<i>Craft/ simple</i>		
Whole economy	3		2		1		4		
DE	Share %	SE	Share %	SE	Share %	SE	Share	SE	N
1995	48.8	1.6	21.1	1.3	11.5	0.9	18.6	1.2	1613
2000	45.4	1.6	21.0	1.3	11.2	1.0	22.4	1.3	1266
2005	39.3	2.0	25.4	1.8	13.7	1.5	21.6	1.6	863
2010	41.0	1.4	27.0	1.2	12.6	0.9	19.3	1.0	1801
All years	44.0	0.8	23.7	0.7	12.1	0.5	20.2	0.6	5543
UK									
1995	35.7	1.9	40.7	1.9	13.3	1.3	10.2	1.1	863
2000	33.6	1.7	38.2	1.7	13.7	1.1	14.6	1.2	1226
2005	28.3	1.8	36.5	1.9	15.5	1.4	19.7	1.6	823
2010	29.0	1.5	37.7	1.5	16.9	1.2	16.4	1.2	1251
All years	31.6	0.9	38.2	0.9	14.9	0.6	15.2	0.6	4163
Manufacturing									
DE									
1995	35.2	3.4	30.8	3.2	23.8	2.5	10.1	1.7	349
2000	29.7	3.3	30.5	3.3	24.7	2.9	15.2	2.6	250
2005	31.5	4.4	31.4	4.4	27.1	4.3	10.0	2.5	139
2010	34.4	3.1	28.9	2.8	26.5	2.9	10.2	1.8	303
All years	33.1	1.7	30.2	1.7	25.4	1.5	11.3	1.1	1041
UK									
1995	31.6	4.5	42.3	4.6	19.6	3.4	6.5	2.3	132
2000	22.8	3.9	42.5	4.5	24.3	3.7	10.4	3.1	186
2005	21.4	4.7	46.4	5.6	22.0	4.2	10.2	3.4	108
2010	18.6	4.3	46.3	5.4	30.3	4.9	4.9	2.1	101
All years	24.3	2.3	43.9	2.5	23.6	2.0	8.2	1.5	527
Private services									
DE									
1995	52.3	3.1	17.1	2.4	5.4	1.2	25.2	2.6	434
2000	42.1	2.8	17.5	2.1	9.1	1.6	31.3	2.6	427
2005	38.5	3.4	14.6	2.3	10.9	2.1	35.9	3.3	277
2010	37.5	2.1	22.9	1.8	11.0	1.3	28.6	1.9	708
All years	42.9	1.4	18.8	1.1	9.0	0.7	29.3	1.2	1836
UK									
1995	32.5	3.2	39.2	3.2	15.4	2.3	12.9	2.1	307
2000	28.0	2.5	38.0	2.6	15.9	1.8	18.1	2.0	521
2005	25.5	3.0	32.9	3.1	19.8	2.6	21.8	2.7	306
2010	25.2	2.4	31.4	2.4	20.8	2.1	22.5	2.0	501
All years	27.5	1.4	35.2	1.4	18.1	1.1	19.1	1.1	1635

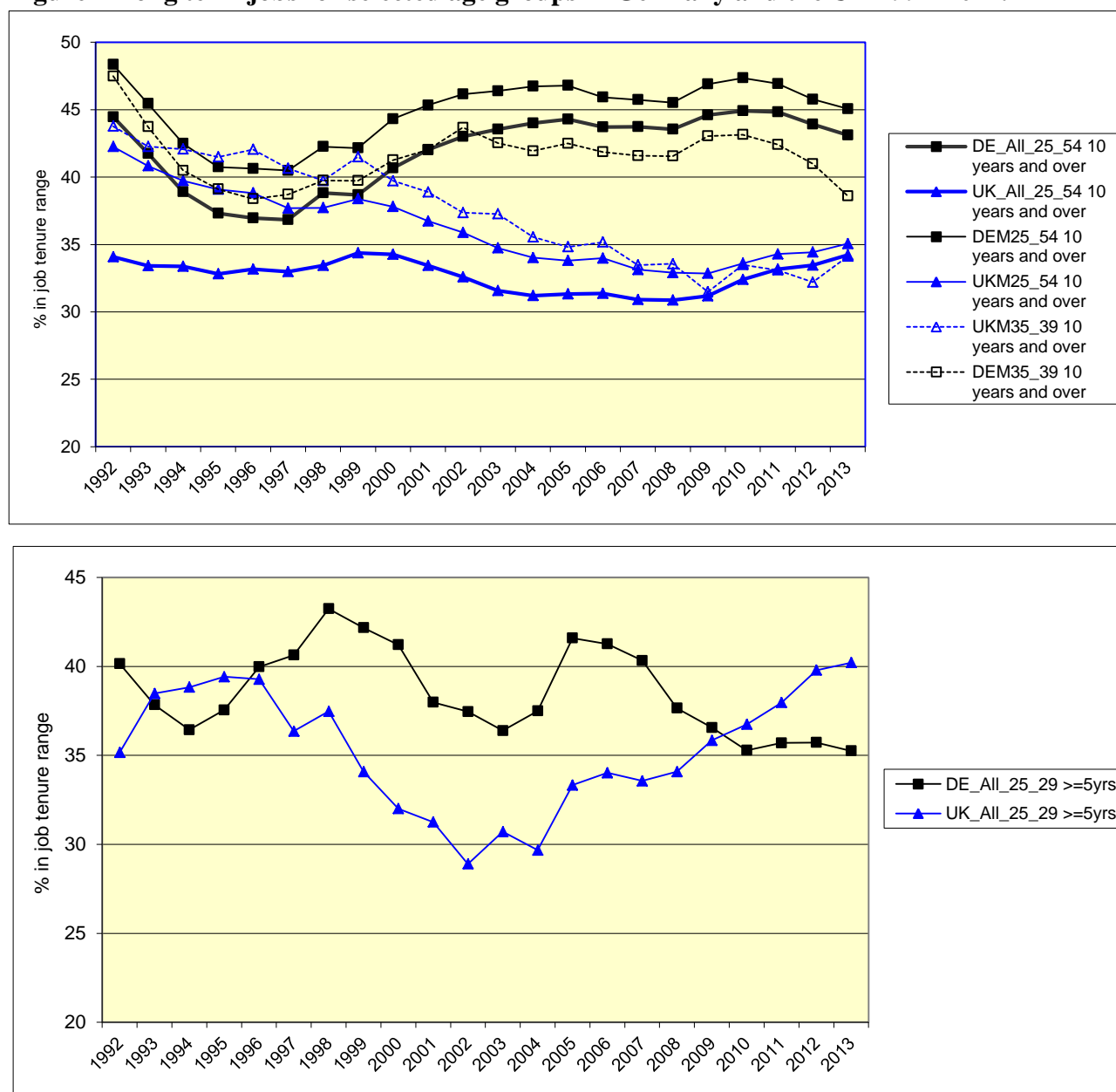
Source: EWCS, weighted estimates. Employees, all firm sizes. Standard errors in % points.

Figure 1. Strictness of employment protection in Germany and the UK 1990-2013



Source: OECD Statextracts: Strictness of employment protection: individual, collective and temporary workers. Key: EPL_coll, _Ind, and _temp relate respectively to collective, individual and temporary worker employment protection.

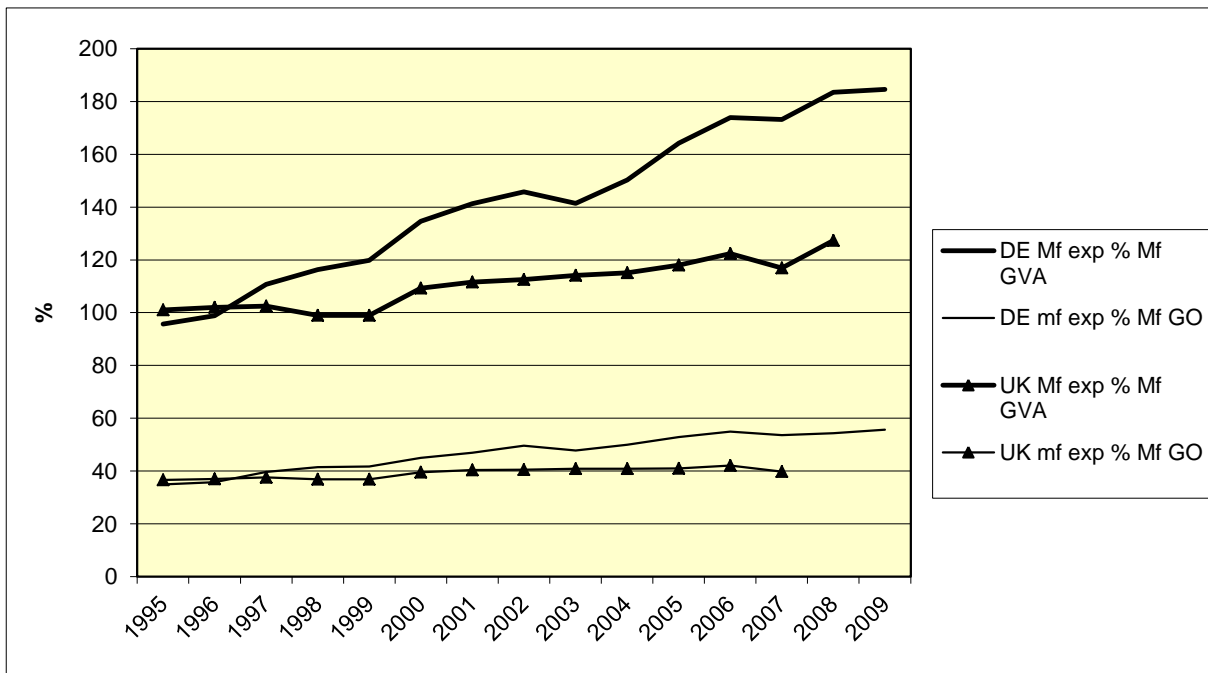
Figure 2 Long term jobs for selected age groups in Germany and the UK 1992-2012.



Source: OECD Statextracts

Notes: Current length of service (percentages of all employees with >=5 and >=10 years' service) for selected age groups of female and male employees: ages 25-29, 35-39, and 25-54. Germany shown by squares and the UK by triangles.

Figure 3. Manufacturing value added and exports in Germany and the UK 1995-2008



Source: OECD STAN Tables. Key: Mf: manufacturing; exp: exports; GVA: gross value added; GO, gross output.

Figure 4 Flexible task assignments within the zone of acceptance

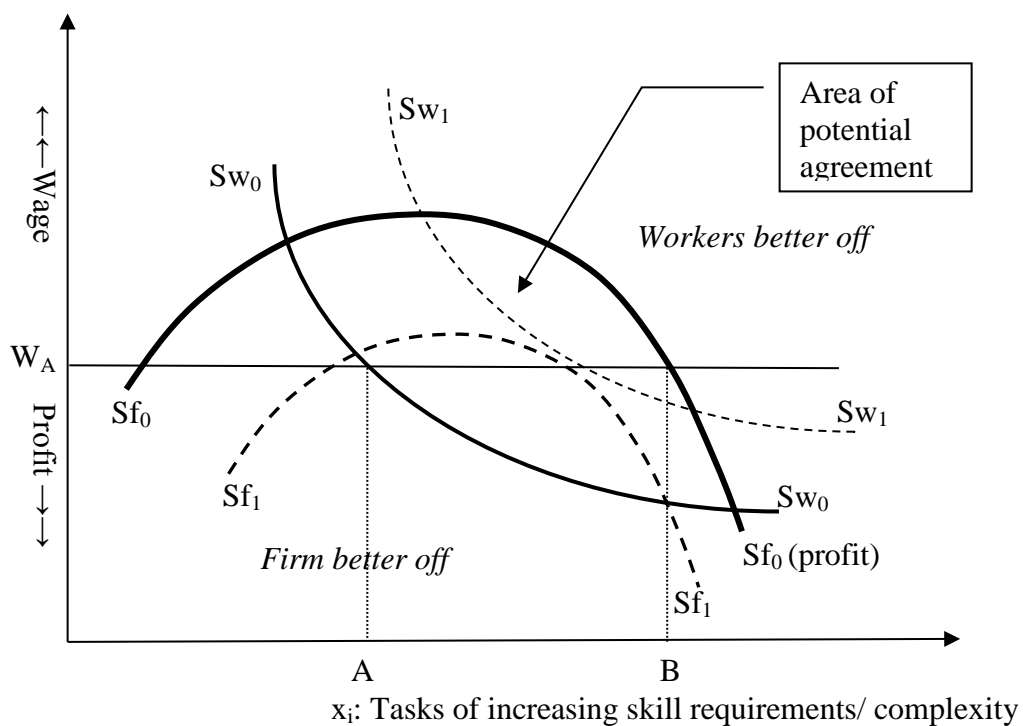
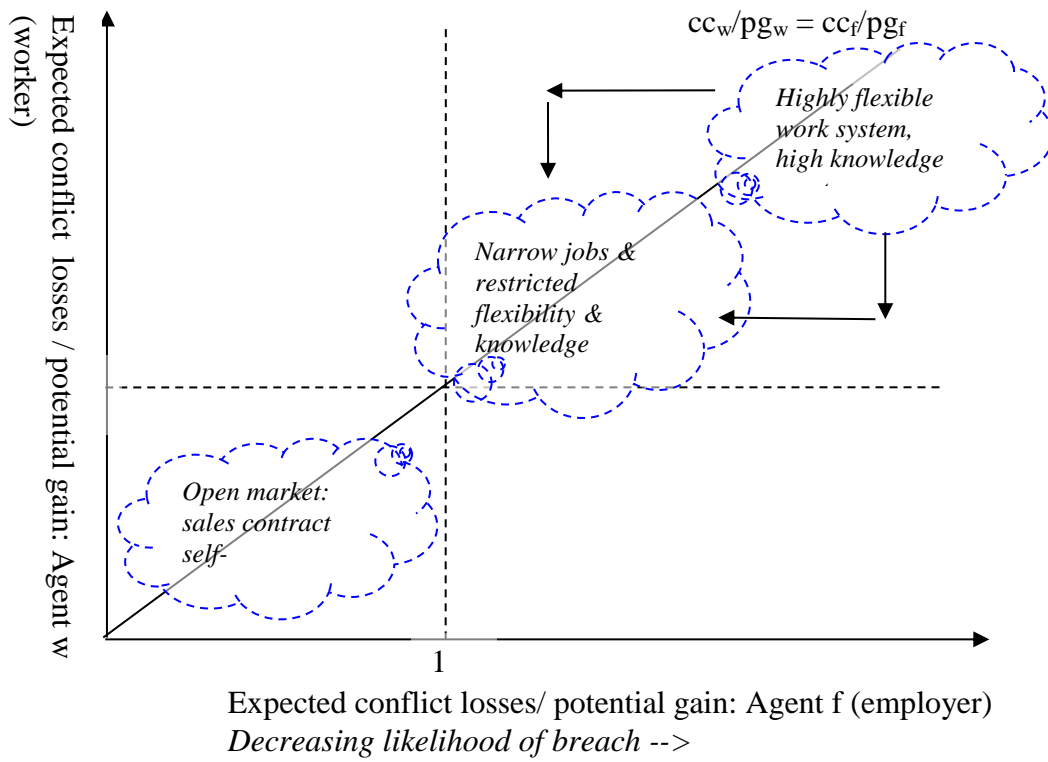


Figure 5 Tipping points and feasible contract models under different conflict cost conditions



10. Appendix

Derivation of the work system clusters using EWCS employee reports on the nature of their work.

The European Working Conditions Survey is carried out by Eurofound. Details of its methodology and questionnaires can be found at: <http://eurofound.europa.eu/working/surveys/>

Lorenz and Valeyre (2005) and Holm et al (2010) used the EWCS to identify common types of work system practiced in the economies of the European Union. They use a survey of the literature on new forms of work organisation to justify their categorisation of the clusters that emerge from their statistical analysis. Their work was subsequently taken up in Employment in Europe 2010 on work systems and working conditions in the EU. Appendix Table A1 lists the work organisation variables taken from the four waves of the EWCS for 1995-2010, and shows their mean values for each of the four types of work system.

For the analysis in this paper, the work system clusters were identified using the full EU-15 sample for employees in all sectors and workplaces and pooling data for all years available. The clusters were derived using STATA's Multiple Correspondence Analysis (MCA), similar to factor analysis for binary variables. From this two dimensions were extracted, which were then used to compute the work system clusters using STATA's kmeans command.

Table A1 Mean values of work organisation questions by type of work system

Employees report that their job involves the following:	EWCS question no in 2010	Learning	Lean	Taylor	Craft/simple
Job involves learning new things	q49f	0.903	0.910	0.403	0.316
Job involves solving unforeseen problems on my own	q49c	0.965	0.948	0.562	0.487
Assess quality of own work	q49b	0.829	0.922	0.595	0.310
Teamwork	q56	0.598	0.795	0.656	0.343
Rotation of tasks	q53	0.429	0.690	0.533	0.263
Complex tasks	q49e	0.749	0.789	0.320	0.183
Autonomy over methods	q50b	0.910	0.746	0.137	0.448
Autonomy over speed	q50c	0.867	0.714	0.216	0.494
Repetitive work (1 min cycles)	q44a	0.052	0.467	0.582	0.165
Repetitive work (10 min cycles)	q44b	0.179	0.688	0.787	0.296
Monotonous	q49d	0.173	0.541	0.760	0.385
Job involves meeting precise quality standards	q49a	0.691	0.928	0.849	0.384
Pace of work dependent on machine speed or product movement	q46d	0.020	0.346	0.597	0.048
Pace of work dependent on direct control of boss	q46e	0.196	0.538	0.695	0.289
Pace of work dependent on work done by colleagues	q46a	0.341	0.726	0.700	0.232
Pace of work dependent on numerical production / performance targets	q46c	0.243	0.606	0.630	0.131
kmeans cluster number		3	2	1	4

Notes: Based on employees in all sectors in workplaces with 1 or more employees (kgroups4) EU-15 countries.

Weighted estimates.

Mean values, for each work system, of binary (0 1) variables based on survey responses.

Source: EWCS 1995-2010